

Remarks/Arguments

Applicant thanks the Examiner for Office Action mailed June 20, 2007. The status of the application is as follows:

- Claims 1-20 and 22-31 are pending. Claims 26-31 are allowed. Claims 11 and 19 have been amended. Claims 21, 32, and 33 have been cancelled.
- The Drawing are objected to.
- Claims 3-4, 5, 15, 17, 21, 23, and 24 are objected to as being dependent upon rejected base claims.
- Claims 5, 11, and 33 are rejected under 35 U.S.C. 112, second paragraph.
- Claims 1 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinno et al. (US 7,085,343 B2) in view of Mori et al. (US 5,311,428).
- Claims 2, 7, 9-11, 19-20, 22, 25, and 32-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinno et al. in view of Mori et al. and further in view of Karellas et al. (US 6,895,077 B2).
- Claims 6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinno et al. in view of Mori et al. and further in view of Crawford et al. (US 4,636,952 A).
- Claims 10-13 and 32-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinno et al. in view of Mori et al. and further in view of Malamud (US 6,760,399 B2).
- Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shinno et al. in view of Mori et al. and further in view of Such et al. (US 2001/0011701 A1).
- Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shinno et al. in view of Mori et al. and further in view of Hanover et al. (US 6,104,780 A).

The objections and rejections are discussed below.

Allowed Claims 26-31

The Examiner is thanked for indicating that **claims 26-31** are allowed.

The Objection to the Drawings

The Office has objected to the drawings under 37 CFR 1.83(a) for not showing every feature of the invention specified in the claims. In particular, the Office asserts that the limitations of claims 6 and 8 are not shown in the drawings. More particularly, the Office asserts that first and second radiation detectors spanning greater than 90 degrees around a gantry, as recited in claims 6 and 8, are not shown in the drawings. This objection should be withdrawn because FIG. 2 of the instant application shows first and second radiation detectors 30 and 34 spanning greater than 90 degrees around a gantry.

This is illustrated FIGS. A and B below, which include FIG. 2 and a coordinate system divided into four 90-degree quadrants. In FIG. A, FIG. 2 has been rotated with respect to the coordinate system to show that the first radiation detector 30 spans an angular interval of the gantry that is greater than 90 degrees. (See also page 5, lines 23-29, of the application). In FIG. B, FIG. 2 has been rotated with respect to the coordinate system to show that the second radiation detector 34 spans an angular interval of the gantry that is greater than 90 degrees. (See also page 5, line 20 to page 6 line 2, of the application).

Hence, the drawings show the features recited in claims 6 and 8, and this objection should be withdrawn.

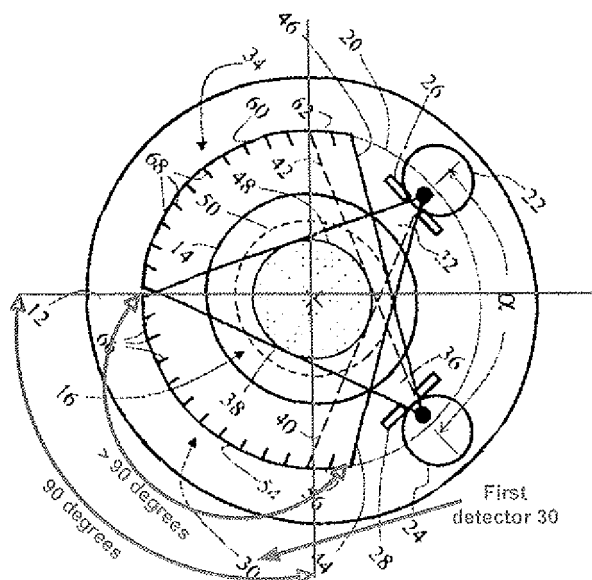


FIG. A

FIG. A – showing the first radiation detector 30 spans more than 90 degrees

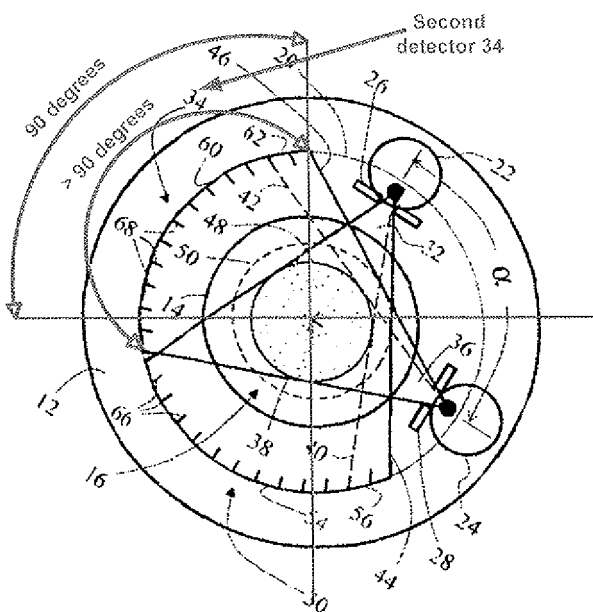


FIG. B

FIG. B – showing the second radiation detector 34 spans more than 90 degrees

The Objection to Claims 3-4, 15, 17, 21, 23, and 24

The Examiner is thanked for indicating that claims 3-4, 15, 17, 21, 23, and 24 would be allowable if rewritten in independent form, including all of the limitations of the base claims and intervening claims. The limitations of **claim 21**, which depends from independent claim 19, have been incorporated into independent claim 19, and claim 21 has been cancelled herein. Applicant reserves the right to rewrite **claims 3-4, 15, 17, 23, and 24** as indicated by the Examiner at a later time if desired.

The Rejection of Claims 5, 11, and 33 under 35 U.S.C. 112, second paragraph

Claims 5, 11, and 33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to **claim 11**, line 2, and **claim 33**, line 14, the Office asserts that the limitation "the conebeam" lacks antecedent basis. Claim 11 has been amended herein to cure the antecedent basis informality. Claim 33 has been cancelled.

With respect to **claim 5**, the Office asserts that the claim limitation that the angular spacing of the detector to the source defines both symmetric and asymmetric beam components with the symmetric component centered on the rotation center is vague and indefinite insofar as it is unclear how it is possible to have both symmetric and asymmetric beam components. Applicant's representative traverses this rejection.

FIG. 2 of the instant application is reproduced below with annotations showing the symmetric component 54 centered around the rotation center and incident on the first detector 30, and the asymmetric component 56 incident on the detector 30. As recited in claim 5, the high resolution portion of the first radiation detector 30 is arranged to receive the symmetric beam component 54, and the low resolution portion of the first radiation detector 30 is arranged to receive the asymmetric beam component 56. FIG. 2 clearly shows the claimed aspects, which are not vague and indefinite at least because they clearly indicate that the angular spacing of the detector to the source defines both

symmetric and asymmetric beam components. (See also page 7, line 33 to page 8, line 8, of the application). In view the above, this rejection should be withdrawn.

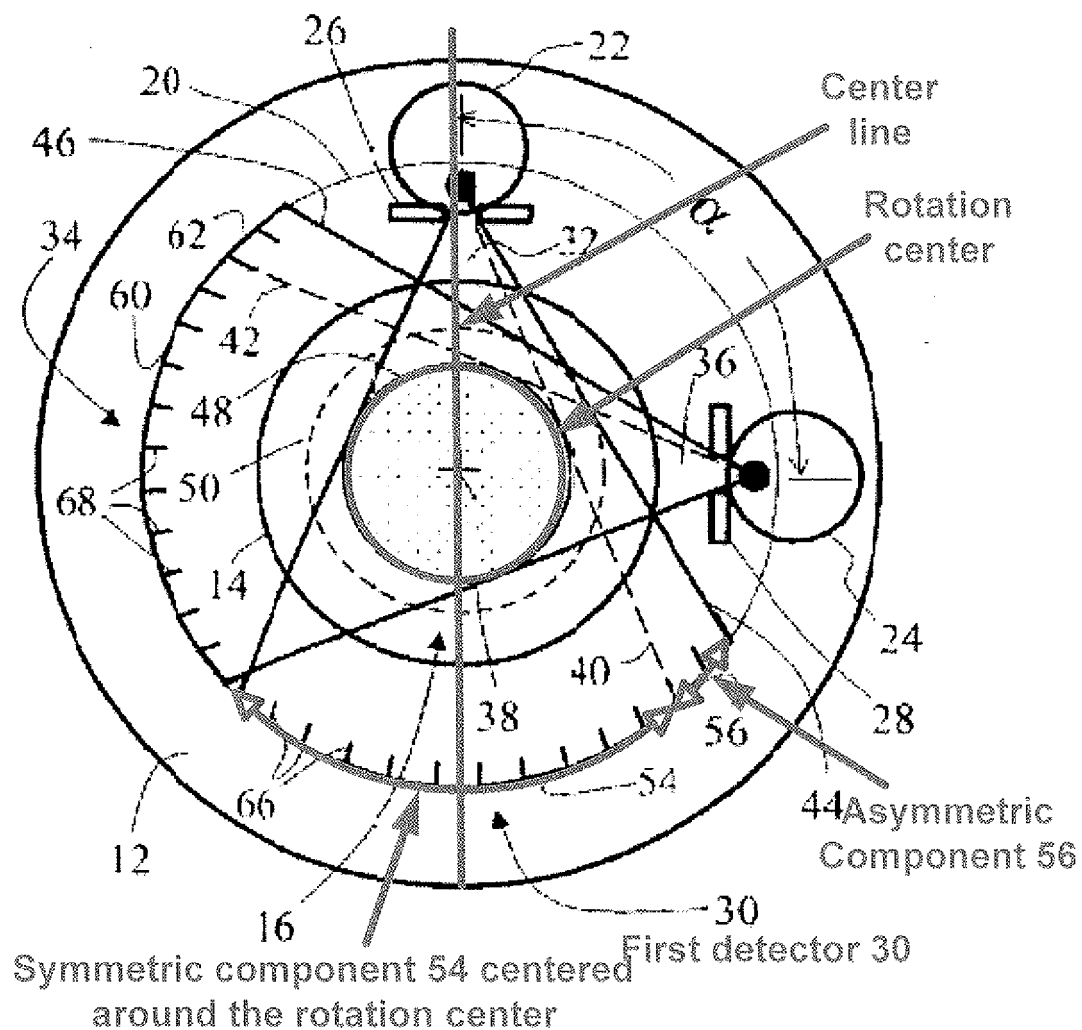


FIG. 2

The Objection to Claim 5

The Examiner is thanked for indicating that claim 5 would be allowable if rewritten in independent form, including all of the limitations of the base claims and intervening claims, and the 35 U.S.C. 112, second paragraph, rejection is overcome. As

discussed above, the 35 U.S.C. 112, second paragraph, rejection should be withdrawn, and applicant reserves the right to rewrite **claim 5** as indicated by the Examiner at a later time if desired.

The Rejection of Claims 1 and 8 under 35 U.S.C. 103(a)

Claims 1 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinno et al. (US 7,085,343 B2) in view of Mori et al. (US 5,311,428). The rejection of claim 1 should be withdrawn because the combination of Shinno et al. and Mori et al. does not teach or fairly suggest all the limitations of amended claim 1 and, therefore, fails to establish a *prima facie* case of obvious with respect to amended claim 1.

To establish a *prima facie* case of obviousness, ... the prior art reference (or references when combined) must teach or suggest all the claim limitations.

MPEP §2143.

Claim 1 is directed towards a computed tomography imaging system that includes , *inter alia*, a first asymmetrically adjustable collimator that is asymmetrically adjustable in a direction generally perpendicular to the longitudinal axis to position a first outer projection of the first radiation relative to a second outer projection of the first radiation, and a second asymmetrically adjustable collimator that is asymmetrically adjustable in a direction generally perpendicular to the longitudinal axis to position a first outer projection of the second radiation relative to a second outer projection of the second radiation. Shinno et al. and Mori et al., individually and in combination, do not teach or suggest these claimed limitations.

The Office asserts that Shinno et al. teaches the above-noted claimed limitations and references column 18, lines 45-49 and 54-59, of Shinno et al. to support this assertion. However, these sections of Shinno et al. do not teach asymmetrically adjustable collimators as recited in claim 1. More particularly, Shinno et al. relates to an X-ray computed tomography apparatus having a scan gantry 3001 that includes a plurality of detection systems, each having an X-ray tube and X-ray detectors. (See

column 18, lines 7-9 and 21-24, and Fig. 18). A first detection system 3011 has a first X-ray tube assembly 3110 and a first X-ray detector 3113, and a second detecting system 3012 has a second X-ray tube assembly 3120 and a second X-ray detector 3123. (See column 18, lines 25-37).

The first X-ray tube assembly 3110 includes a first X-ray tube 3111 and a first X-ray collimator 3112 that limits the divergence angle (fan angle or viewing angle) of X-rays emitted from the first X-ray tube 3111. (See column 18, lines 38-45). The first X-ray collimator 3112 has a plurality of movable shield plates and driving units that separately move the plates. (See column 18, lines 45-47). The aperture width and aperture center position can be arbitrarily adjusted by controlling the position of each of the plurality of movable shield plates. (See column 18, lines 47-49). The second X-ray tube assembly 3120 includes a second X-ray tube 3121 and a second X-ray collimator 3122 that likewise limits the divergence angle of X-rays emitted from the second X-ray tube 3121. (See column 18, lines 50-54). The second X-ray collimator 3122 also has a plurality of movable shield plates and driving units that separately move the plates, and the aperture width and aperture center position can be arbitrarily adjusted by controlling the position of each of the plurality of movable shield plates. (See column 18, lines 54-59).

The aperture widths of the first and second X-ray collimators 3112 and 3122 can be set to different widths so that the aperture width of the first X-ray collimator 3112 collimates emitted radiation to irradiate the entire field of view (FOV) while the aperture width of the second X-ray collimator 3122 collimates emitted radiation to irradiate only a region of interest (ROI) within the FOV.

Hence, the referenced sections of Shinno et al. teach a multi-tube computed tomography apparatus in which the radiation emitted by each tube is collimated by a corresponding x-ray tube collimator, and an aperture width and an aperture center position for each collimator are adjusted by controlling the position of a plurality of movable shield plates of each collimator. However, Shinno et al. is silent regarding asymmetrically adjustable collimators; Shinno et al. does not teach or suggest first and

second asymmetrically adjustable collimators that respectively are asymmetrically adjustable in a direction generally perpendicular to the longitudinal axis to respectively position first outer projections of the first and second radiation relative to second outer projections of the first and second radiation as recited in claim 1.

In the previous Office Action, the Office conceded that Mori et al. does not teach these aspects.

In view of the above, withdrawal of this rejection and allowance of claim 1 is respectfully requested.

Claim 18 depends from claim 1 and is allowable at least by virtue of its dependency from claim 1.

The Rejection of Claims 2, 7, 9-11, 19-20, 22, 25, and 32-33 under 35 U.S.C. 103(a)

Claims 2, 7, 9-11, 19-20, 22, 25, and 32-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinno et al. in view of Mori et al. and further in view of Karellas et al. (US 6,895,077). **Claims 2, 7, and 9-11** depend from claim 1 and are allowable at least by virtue of their dependencies from claim 1. **Independent claim 19** has been amended herein with the limitations of claim 21, which depends therefrom. As noted above, the Office has indicated that claim 21 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. As such, claim 19 is now in condition for allowance. **Claims 20, 22, and 25** depend from claim 19 and are allowable at least by virtue of their dependencies from claim 19. **Claims 32 and 33** have been cancelled and, thus, the rejection of claims 32 and 33 is moot.

The Rejection of Claims 6 and 8 under 35 U.S.C. 103(a)

Claims 6 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinno et al. in view of Mori et al. and further in view of Crawford et al. (US 4,636,952 A). **Claims 6 and 8** depend from claim 1 and are allowable at least by virtue of their dependencies from claim 1.

The Rejection of Claims 10-13 and 32-33 under 35 U.S.C. 103(a)

Claims 10-13 and 32-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shinno et al. in view of Mori et al. and further in view of Malamud (US 6,760,399 B2). **Claims 10-13** depend from claim 1 and are allowable at least by virtue of their dependencies from claim 1. As noted above, **claims 32 and 33** have been cancelled herein. Accordingly, this rejection should be withdrawn.

The Rejection of Claim 14 under 35 U.S.C. 103(a)

Claim 14 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Shinno et al. in view of Mori et al. and further in view of Such et al. (US 2001/001171 A1) **Claim 14** depends from claim 1 and is allowable at least by virtue of its dependency from claim 1.

The Rejection of Claim 16 under 35 U.S.C. 103(a)

Claim 16 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Shinno et al. in view of Mori et al. and further in view of Hanover et al.. **Claim 16** depends from claim 1 and is allowable at least by virtue of its dependency from claim 1.

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Amdt. Dated: July 24, 2007
Reply to Office Action Dated: June 20, 2007

Conclusion

In view of the foregoing, it is submitted that the pending claims distinguish patentably and non-obviously over the prior art of record. An early indication of allowability is earnestly solicited.

Respectfully submitted,

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